

## COURSE SYLLABUS Applied Deep Learning

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**Prerequisite:** IST 687. Exceptions may be given to students who have acquired skills equivalent to what is taught in IST 387/687.

**Audience:** Graduate Students

**Description:** Introduction to deep learning concepts and applications development techniques required to develop deep learning-based solutions. Hands-on experience developing models using open source frameworks and packages.

**Additional Course Description:**

This course will introduce deep learning methods for classifying data and predicting outcomes. Both the theories and the practice of deep learning techniques will be discussed and applied to real-world problems. Students will acquire hands-on experience developing deep learning-based solutions using state-of-the-art deep learning-based software.

The format of the class meetings will be a combined lecture and lab format, with lectures and class discussions to cover material and lab time to investigate small examples for the topic of the week. There will be weekly readings based on the textbook and on other materials, which will be posted online.

**Credits:** 3

**Learning Objectives:**

**After taking this course, the students will be able to:**

- Document, analyze, and translate data analytics needs into technical designs and solutions.
- Apply deep learning-based concepts, algorithms, and evaluation methods to address real-world problems.

**Bibliography/Texts/Supplies—Optional:**

Glassner, A. (2021). *Deep learning: A visual approach*.

## **Software**

- Python and the Keras deep learning framework

## **Typical Course Schedule:**

Week	Topic Areas	Text Book	Date Available	Date Due
	<b>Artificial Neural Networks</b>			
1	Introduction to AI, Machine Learning, and Deep Learning			
2	Deep Learning Fundamentals			
3	Backpropagation and Optimization		Homework 1	Quiz 1
4	Convolutional Neural Network Fundamentals			Homework 1
5	Convolutional Neural Networks Advanced Topics			
6	Transfer Learning and Autoencoding		Homework 2	Quiz 2
7	Introduction to Recurrent Neural Networks			Homework 2
8	Embedding			
9	Recurrent Neural Networks and Language Processing		Homework 3	Quiz 3
10	Reinforcement Learning Fundamentals			Homework 3
11	Finals Week			Project Due

Live session instructors will provide additional details regarding submission deadlines.

## **Requirements:**

Your final grade is determined by your performance on the items in the table below. An overview of each item is provided in the remainder of this section.

Assessment Item	Weight %
Quizzes (3)	30
Homework Assignments (3)	30
Group Project	20
Lab/Class Participation	20
Total	100

- **Homework Assignments:** Assignments must be professionally prepared and submitted electronically to the Assignments and Deliverables section of the course. All homework assignment instructions can be found in the iSchool Jupyter Hub. No PDF files please.
- **Lab/Class Participation:** Live session instructors will provide additional details regarding lab submission and uploads.
- **Group Project:** The objective of the project is to work as a team to apply concepts taught in this class to solve a data analytics problem.

**Grading:**

For this class, an “A” would mean the student has the capability to independently solve a simple data analytics task. Below is a common formula for number-to-letter grade conversion.

Grade	Points	Grade	Points	Grade	Points	Grade	Points
		B+	87–89	C+	77–79	F	0–69
A	93–100	B	83–86	C	73–76		
A–	90–92	B–	80–82	C–	70–72		

*Grades of D and D– may not be assigned to graduate students.*

**Course-Specific Policies on Attendance, Late Work, Makeup Work, Examinations****If Outside Normal Class Time, and So On:**

- **Registration:** Students must register prior to the first class or may be restricted from registering. If you are registered but not present at the first class, you run the risk of being administratively deregistered from this course so that your seat can be given to a student on the wait list.
- **Late Policy for Assignments:** To ensure fast return, all assignments should be submitted on time. A 1-hour grace period is given to accommodate any incidents around deadline. Late policy will be enforced starting from the second hour. You are free to discuss the assignments with your classmates, but you must write up the report by yourself. Plagiarism cases will be reported to the university.
- **Communications:** This course will use Blackboard as the main communication platforms for class exercises and notifications. Students are required to check their Blackboard accounts on a regular basis.

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## **Educational Use of Student Work**

I intend to use academic work that you complete this semester in subsequent semesters for educational purposes. Before using your work for that purpose, I will either get your written permission or render the work anonymous by removing all personal identification.

## **University Attendance Policy**

Attendance in classes is expected in all courses at Syracuse University. Students are expected to arrive on campus in time to attend the first meeting of all classes for which they are registered. Students who do not attend classes starting with the first scheduled meeting may be academically withdrawn as not making progress toward degree by failure to attend. Instructors set course-specific policies for absences from scheduled class meetings in their syllabi.

It is a federal requirement that students who do not attend or cease to attend a class to be reported at the time of determination by the faculty. Faculty should use "ESPR" and "MSPR" in Orange Success to alert the Office of the Registrar and the Office of Financial Aid. A grade of NA is posted to any student for whom the Never Attended flag is raised in Orange SUccess. More information regarding Orange SUccess can be found [here](http://orangesuccess.syr.edu/getting-started-2/), at <http://orangesuccess.syr.edu/getting-started-2/>. Students should also review the University's religious observance policy and make the required arrangements at the beginning of each semester.

## **Syracuse University Policies:**

Syracuse University has a variety of other policies designed to guarantee that students live and study in a community respectful of their needs and those of fellow students. Some of the most important of these concerns:

**Diversity and Disability** (ensuring that students are aware of their rights and responsibilities in a diverse, inclusive, accessible, bias-free campus community) can be found [here](https://www.syracuse.edu/life/accessibilitydiversity/), at <https://www.syracuse.edu/life/accessibilitydiversity/>.

**Religious Observances Notification and Policy** (steps to follow to request accommodations for the observance of religious holidays) can be found [here](http://supolicies.syr.edu/studs/religious_observance.htm), at [http://supolicies.syr.edu/studs/religious\\_observance.htm](http://supolicies.syr.edu/studs/religious_observance.htm).

**Orange SUccess** (tools to access a variety of SU resources, including ways to communicate with advisors and faculty members) can be found [here](http://orangesuccess.syr.edu/getting-started-2/), at <http://orangesuccess.syr.edu/getting-started-2/>.

## **Disability-Related Accommodations:**

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to meet with me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Office of Disability Services (ODS) in this process.

If you would like to discuss disability-accommodations or register with ODS, please visit their [website](http://disabilityservices.syr.edu/) at <http://disabilityservices.syr.edu/>. Please call (315) 443-4498 or email [disabilityservices@syr.edu](mailto:disabilityservices@syr.edu) for more detailed information.

ODS is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Because academic accommodations may require early

planning and generally are not provided retroactively, please contact ODS as soon as possible to begin this process.

**Academic Integrity Policy:**

Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and nongrade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. SU students are required to read an online summary of the [University's academic integrity](#) expectations and provide an electronic signature agreeing to abide by them twice a year during preterm check-in on [MySlice](#).

**Course Evaluations:**

There will be an end-of-course evaluation for you to complete this term. This evaluation will be conducted online and is entirely anonymous. You will receive an official notice in your email account with the evaluation website link and your passcode. Please take the time to fill out this evaluation because your feedback and support of this assessment effort is very much appreciated. The school carefully reviews ratings and comments that you submit, and these factor into decisions about course, program and instructor development.